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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,785	09/23/2003	Alexandra Fuchs	242928US0	1915

22850 7590 11/30/2005

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ALEXANDRIA, VA 22314

EXAMINER

CULBERT, ROBERTS P

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/667,785

Applicant(s)

FUCHS ET AL.

Examiner

Roberts Culbert

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 17-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 12, 14 and 15 is/are rejected.
- 7) ☒ Claim(s) 8-11, 13 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/12/03</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I, claims 1-16 in the reply filed on 10/11/05 is acknowledged. The traversal is on the grounds that there is no evidence that the product may be made by another materially different process. The argument is not persuasive because the examiner has disclosed a materially different process by which the claimed product may be made in the previous restriction requirement. Further, applicant has traversed on the grounds that a search of both groups would not present an undue burden. This is not found persuasive because a search for both groups would present an undue burden on the examiner and the office since a search and examination for both the product and process inventions would not be coextensive.

The requirement is still deemed proper and is therefore made FINAL.

Claim Objections

Claim 6 is objected to because of the following informalities: Claim 6 is unclear since step b comprises forming through holes within layer B. Appropriate correction or clarification is requested.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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Claims 1-6, 12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication 2003/0205552 to Hansford et al. (See also U.S. Provisional Patent Application 60/166,049 to Hansford et al.)

Regarding claim 1, Hansford et al. teach a method of producing a biomimetic membrane comprising depositing on at least one of the principal surfaces of a plate A of micro-machinable material a layer B comprising one or several strata each formed of a micro-machinable material, forming one or several through holes within layer B, each hole having a wall formed of the material(s) of layer B and a bottom formed of the plate A, depositing on layer B, and on the wall and bottom of each hole, a layer C of a micro-machinable material, which closely hugs the wall and bottom of the hole, eliminating layer C from the underlying face of layer B and at the center of each hole from the underlying face of plate A while at the same time leaving residue of layer C on the wall of the holes, the residue delimiting a pore in which the wall is formed of the material of layer C and in which the bottom is formed of the material of layer A and liberating at least the part of layer B in which are found one or several pores, by the partial or total elimination of plate A.

Regarding Claim 2, Hansford et al. teach using 5 um of polysilicon as the base layer.

Regarding Claim 3, Hansford et al. teach forming between a single hole and 100 million holes are formed per mm² of surface area of layer B.

Regarding Claim 4, Hansford et al. teach substantially cylindrical holes (Appendix B)

Regarding Claims 5 and 6, Hansford et al. teach using anisotropic dry (plasma) etching.

Regarding Claim 12, Hansford et al. teach that layer B comprises a single stratum formed of a different material than layer C.

Regarding Claim 14, Hansford et al. teach that the materials forming plates A and layers B and C are chosen from silicon, polycrystalline silicon, silica, silicon nitride and silicon oxide.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2003/0205552 to Hansford et al. (See also U.S. Provisional Patent Application 60/166,049 to Hansford et al.) in view of U.S. Patent 6,660,648 to Galambos et al.

Regarding Claim 7, Hansford et al. do not expressly teach using reactive ion etching. Hansford et al. more broadly recite plasma etching. However, reactive ion etching is a preferred isotropic plasma etching method well suited to the formation of narrow pores in silicon substrates. For example, Galambos et al. teach using reactive ion etching to form a porous silicon membrane. It would have been obvious to one of ordinary skill in the art at the time of invention to use reactive ion etching to produce a semipermeable membrane using suitable plasma etching techniques.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2003/0205552 to Hansford et al. (See also U.S. Provisional Patent Application 60/166,049 to Hansford et al.) in view of U.S. Patent 5,651,900 to Keller et al.

Regarding Claim 15, Hansford et al. teach the method of the invention substantially as claimed, but do not teach functionalizing the walls of the pores.

However, Keller et al. teach that the pore walls of a micromachined filter may be coated with a functional group. (See Figures 10a-11b, and Col. 11, Line 23 – Col. 12, Line 57) It would have been

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obvious to one of ordinary skill in the art at the time of invention to use functional groups on the pore sidewalls as shown by Keller et al. in order to produce a molecular filter of the various disclosed types.

Allowable Subject Matter

Claims 8-11, 13 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or render obvious a method of method of producing a biomimetic membrane comprising depositing on at least one of the principal surfaces of a plate A of micro-machinable material a layer B comprising one or several strata each formed of a micro-machinable material, forming one or several through holes within layer B, (each hole having a wall formed of the materials of layer B and a bottom formed of the plate A, depositing on layer B, and on the wall and bottom of each hole, a layer C of a micro-machinable material, which closely hugs the wall and bottom of the hole, eliminating layer C from the underlying face of layer B and at the center of each hole from the underlying face of plate A while at the same time leaving residue of layer C on the wall of the holes (see step of "patterning anchor points"), the residue delimiting a pore in which the wall is formed of the material of layer C and in which the bottom is formed of the material of layer A and liberating layer B in which are found one or several pores, by total elimination of plate A.

Further, prior art of record fails to teach or render obvious a method of producing a biomimetic membrane comprising depositing on at least one of the principal surfaces of a plate A of micro-machinable material a layer B comprising several strata each formed of a micro-machinable material different from each other, forming one or several through holes within layer B, (each hole having a wall formed of the material(s) of layer B and a bottom formed of the plate A, depositing on layer B, and on the wall and bottom of each hole, a layer C, which closely hugs the wall and bottom of the hole, and is made from of a micro-machinable material different from the several strata of layer B, eliminating layer C from the underlying face of layer B and at the center of each hole from the underlying face of plate A while at

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the same time leaving residue of layer C on the wall of the holes (see step of "patterning anchor points"), the residue delimiting a pore in which the wall is formed of the material of layer C and in which the bottom is formed of the material of layer A and liberating at least the part of layer B in which are found one or several pores, by the partial or total elimination of plate A.

Further, prior art of record fails to teach or render obvious a method of producing a biomimetic membrane comprising depositing on at least one of the principal surfaces of a plate A of micro-machinable material a layer B comprising one or several strata each formed of a micro-machinable material, forming one or several through holes within layer B, (each hole having a wall formed of the material(s) of layer B and a bottom formed of the plate A, depositing on layer B, and on the wall and bottom of each hole, a layer C of a micro-machinable material, which closely hugs the wall and bottom of the hole, eliminating layer C from the underlying face of layer B and at the center of each hole from the underlying face of plate A while at the same time leaving residue of layer C on the wall of the holes (see step of "patterning anchor points"), the residue delimiting a pore in which the wall is formed of the material of layer C and in which the bottom is formed of the material of layer A, fastening, on the free face of layer B, a plate A' of a micro-machinable material, and hollowing out plates A and A' so as to liberate the part of layer B in which are found the pores, while at the same time leaving the edges of said plates as well as a part of their face opposite to that situated in contact with said layer B.

Further, prior art of record fails to teach or render obvious a method of producing a biomimetic membrane comprising depositing on at least one of the principal surfaces of a plate A of micro-machinable material a layer B comprising one or several strata each formed of a micro-machinable material, forming one or several through holes within layer B, (each hole having a wall formed of the material(s) of layer B and a bottom formed of the plate A, depositing on layer B, and on the wall and bottom of each hole, a layer C of a micro-machinable material, which closely hugs the wall and bottom of the hole, eliminating layer C from the underlying face of layer B and at the center of each hole from the underlying face of plate A while at the same time leaving residue of layer C on the wall of the holes (see step of "patterning anchor points"), the residue delimiting a pore in which the wall is formed of the material of layer C and in which the bottom is formed of the material of layer A, liberating at least the part of layer

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B in which are found one or several pores, by the partial or total elimination of plate A, and a step of functionalisation of the wall of the pores and portions of the principal faces of the membrane not occupied by the wall where the functionalisations of the wall and face not occupied by said wall are different to each other.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. Culbert
Examiner
Art Unit 1763



Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763